8.701

Introduction to Nuclear and Particle Physics
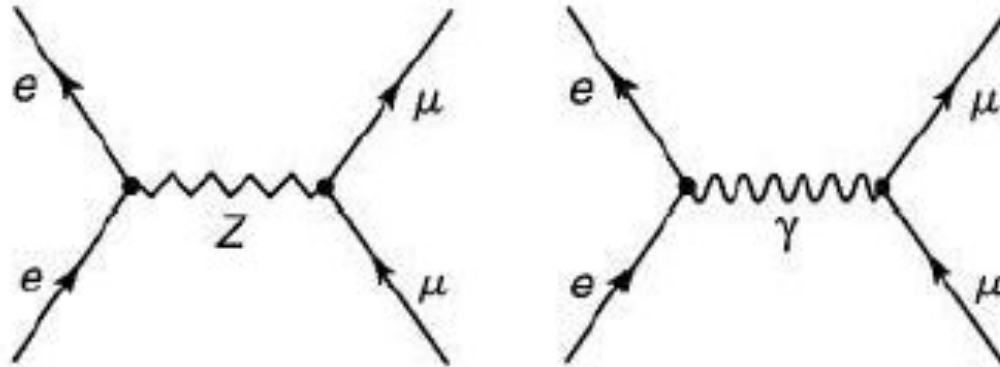
Markus Klute - MIT

6. Weak Interaction

6.5 Neutral Current

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Weak and electromagnetic contributions

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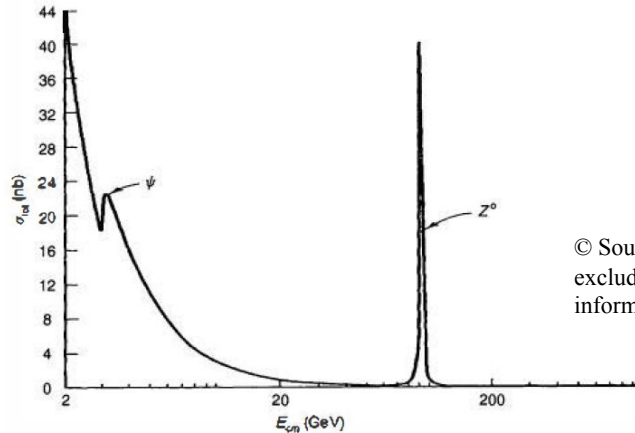Studies in detail at the SLC at SLAC and LEP at CERN

Relative contributions

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(see Griffiths chapter 9.6 for details)

$$\sigma \simeq \frac{(\hbar c g_z^2 E)^2}{48\pi} \frac{[(c_V^f)^2 + (c_A^f)^2][(c_V^e)^2 + (c_A^e)^2]}{[(2E)^2 - (M_Z c^2)^2]^2 + (\hbar M_Z c^2 \Gamma_Z)^2}$$

$$\sigma = \frac{(\hbar c g_e^2)^2}{48\pi} \frac{(Q^f)^2}{E^2}$$

$$\frac{\sigma_Z}{\sigma_\gamma} \cong \frac{1}{8}\left(\frac{M_Z c^2}{\hbar \Gamma_Z}\right) \approx 200$$

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